Texas A&M Transportation Institute

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MEASURING BETTER:
Improvements to Measuring Performance through Destination Access

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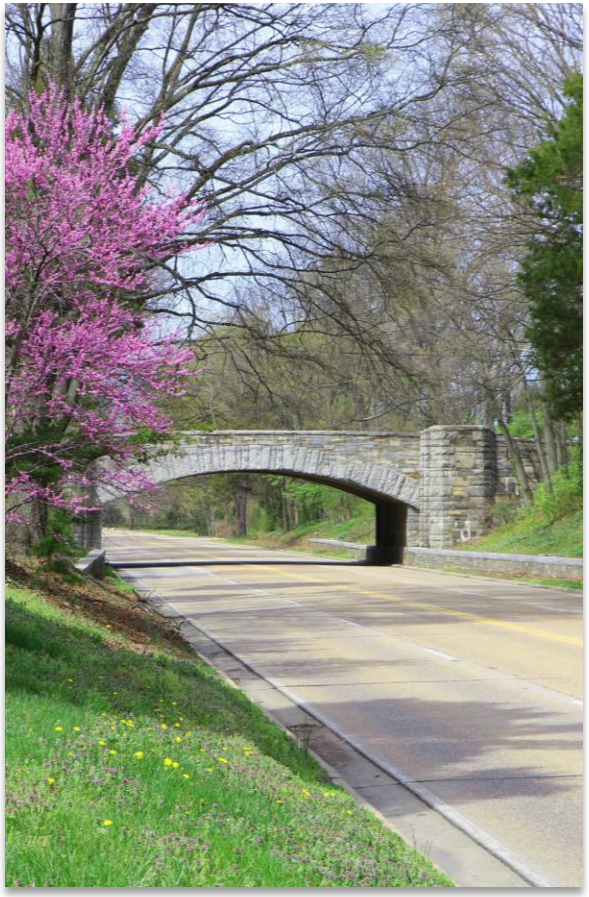
What is Destination Access and Why Does It Matter?

What is the Difference Between Traditional and Observed Access?



TRADITIONAL DESTINATION ACCESS measures ***potential*** travel, describing the ease with which a traveler ***could reach*** valued destinations such as jobs, schools, grocery stores, or other services.

OBSERVED DESTINATION ACCESS uses ***observed*** travel from auto trip origin-destination data to describe and measure where people are traveling. It describes the destinations that travelers and goods ***do reach*** within a region and how a road segment, the larger network, or area-wide transportation policies may impact that access.

Observed Access Concepts

COVERAGE

Measures how much of an area people or goods get to.

RANGE

Measures how far trips are going, on average.

DENSITY

Measures how many trips start or end in a specific area.

What Can I Do with These New Measures?

Transportation Planning

- Goal Setting
- Corridor Planning
- Facility Utilization
- Network & Connectivity Analysis

Project Selection & Prioritization

- Include Measures In Project Selection Criteria

Project Evaluation

- Before/After Evaluation
- Construction Impact Evaluation

Performance Monitoring

- Goal Assessment
- Strategy Adjustment

Measurement Perspectives

ORIGIN PERSPECTIVE: based on a single or grouping of origins and the destinations accessible to them under a time constraint (e.g., the number of grocery stores within a thirty-minute travel time of one's house).

DESTINATION PERSPECTIVE: based on the number of origins or populations within a given distance or time from a single or group of destinations (e.g., the number of students within 1 miles of a school).

Measurement Scales – Measuring for Different Needs

1 Urban Area Scale

2 Zonal Scale

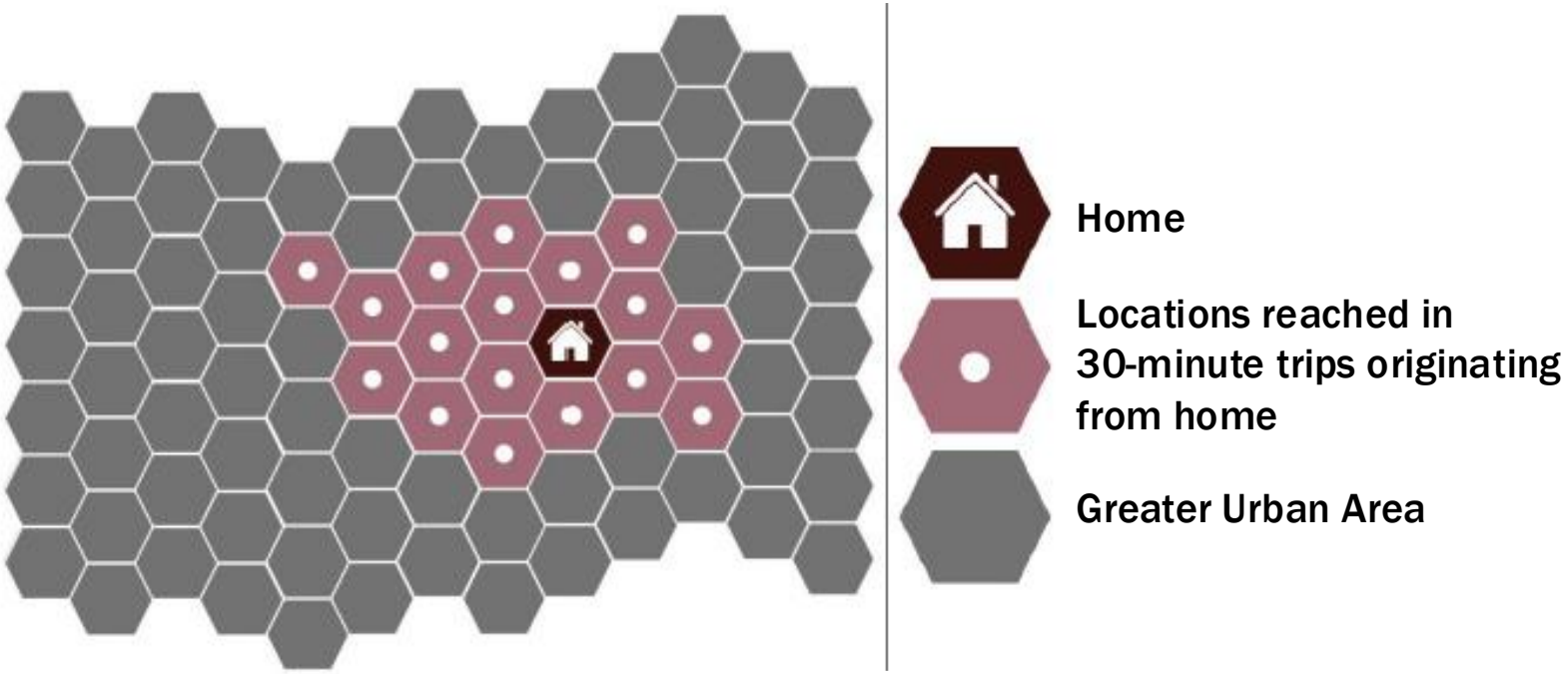
(H3, Census Tract, etc.)

3 Road Segment Scale

Coverage

COVERAGE measures how much of an area people or goods get to in a given time constraint.

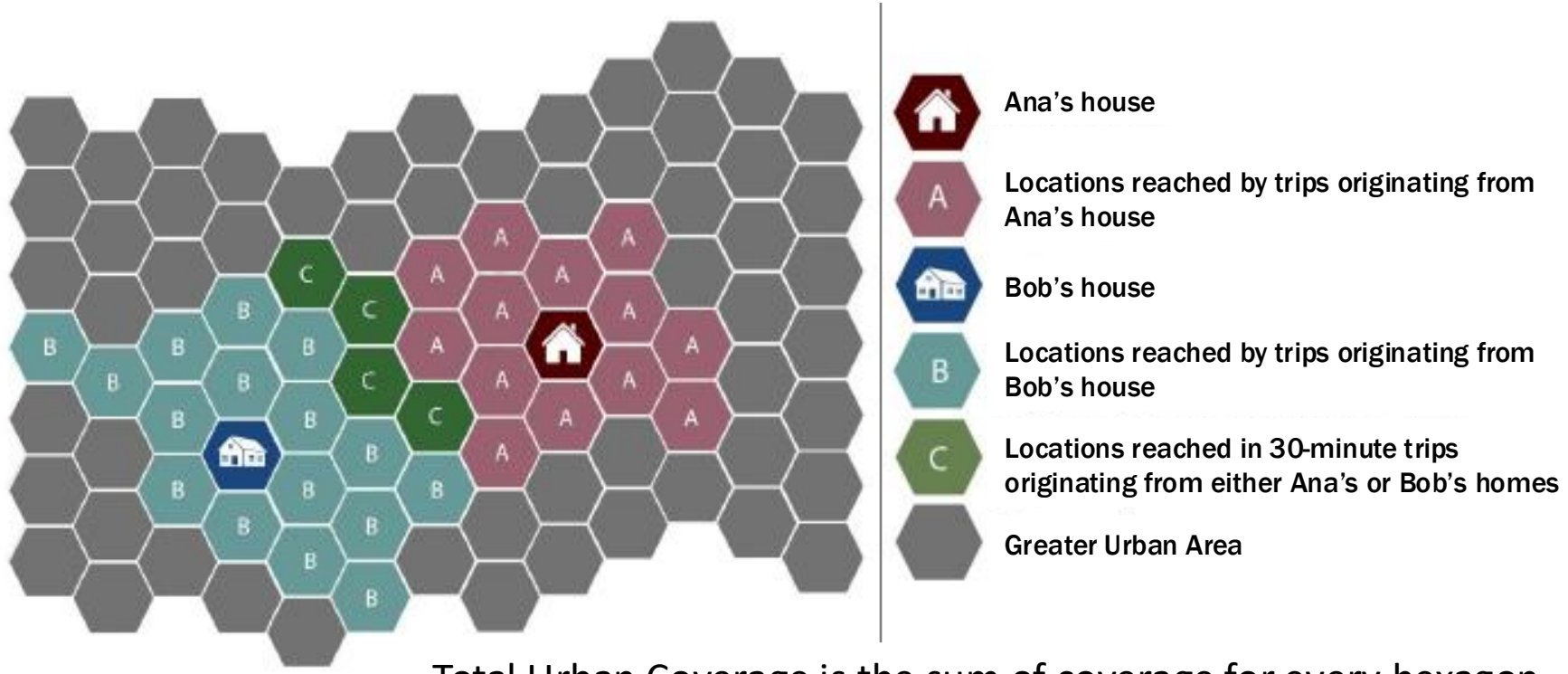
How much of an area is reachable from an origin?



Coverage is the number of hexagons reached by trips originating from an origin hexagon (home) divided by the total number of hexagons in the urban area.

Coverage Measures

- **NEIGHBORHOOD OR ZONE:**
  Area Coverage Ratio
- **URBAN AREA:**
  Total Urban Coverage
- **SEGMENT:**
  Segment Coverage Ratio

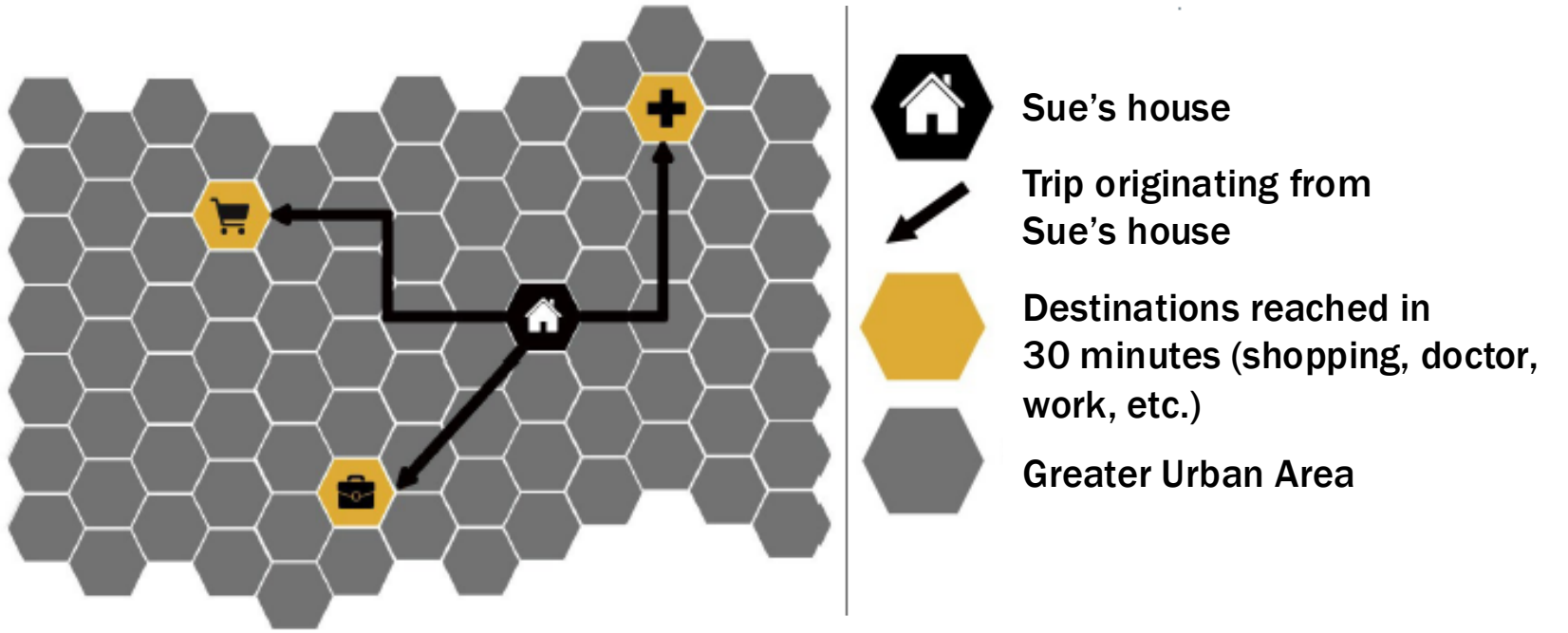


Total Urban Coverage is the sum of coverage for every hexagon in the urban area divided by the total number of hexagons in the urban area.

Range

RANGE measures how far trips are going on average.

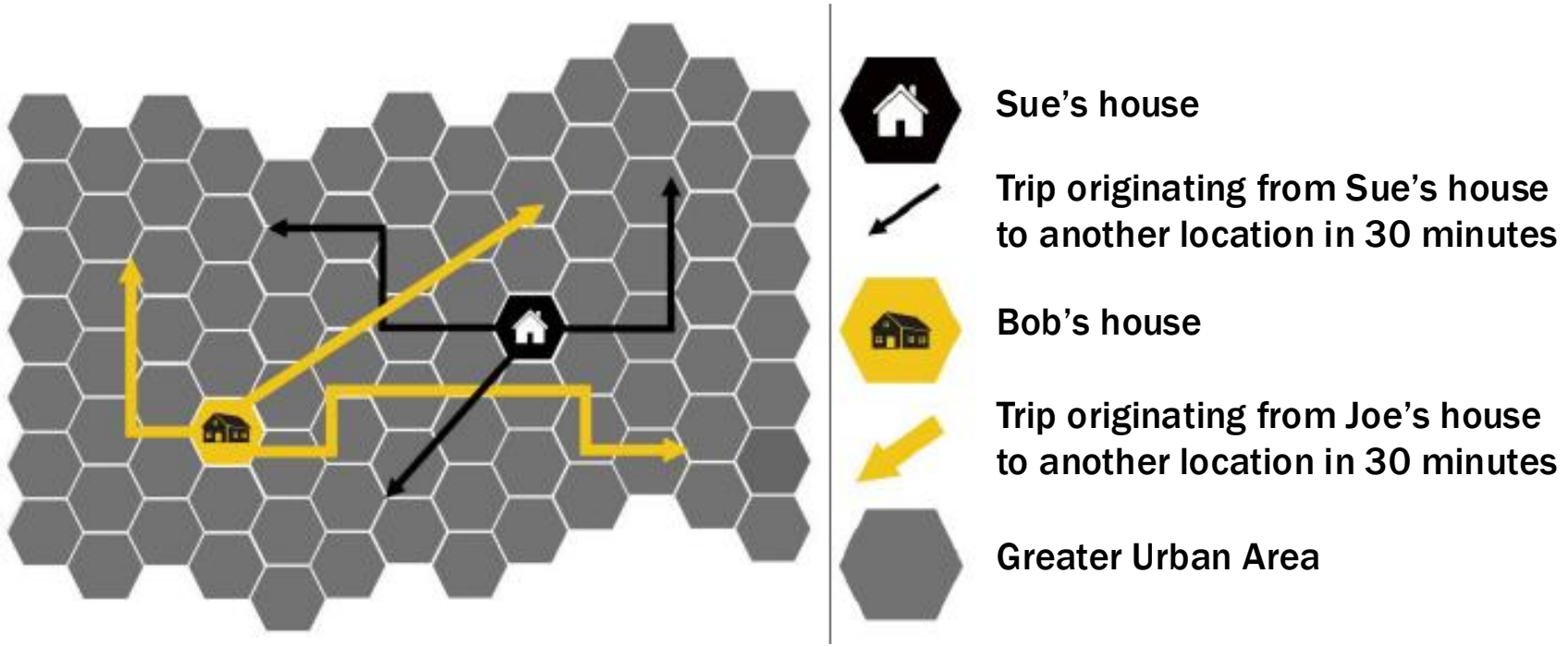
It looks at trip length originating in zones of an urban area to produce an average trip distance.



Range is the sum of trip lengths originating in an origin hexagon (home) divided by the total number of trips originating in that hexagon (home).

Range Measures

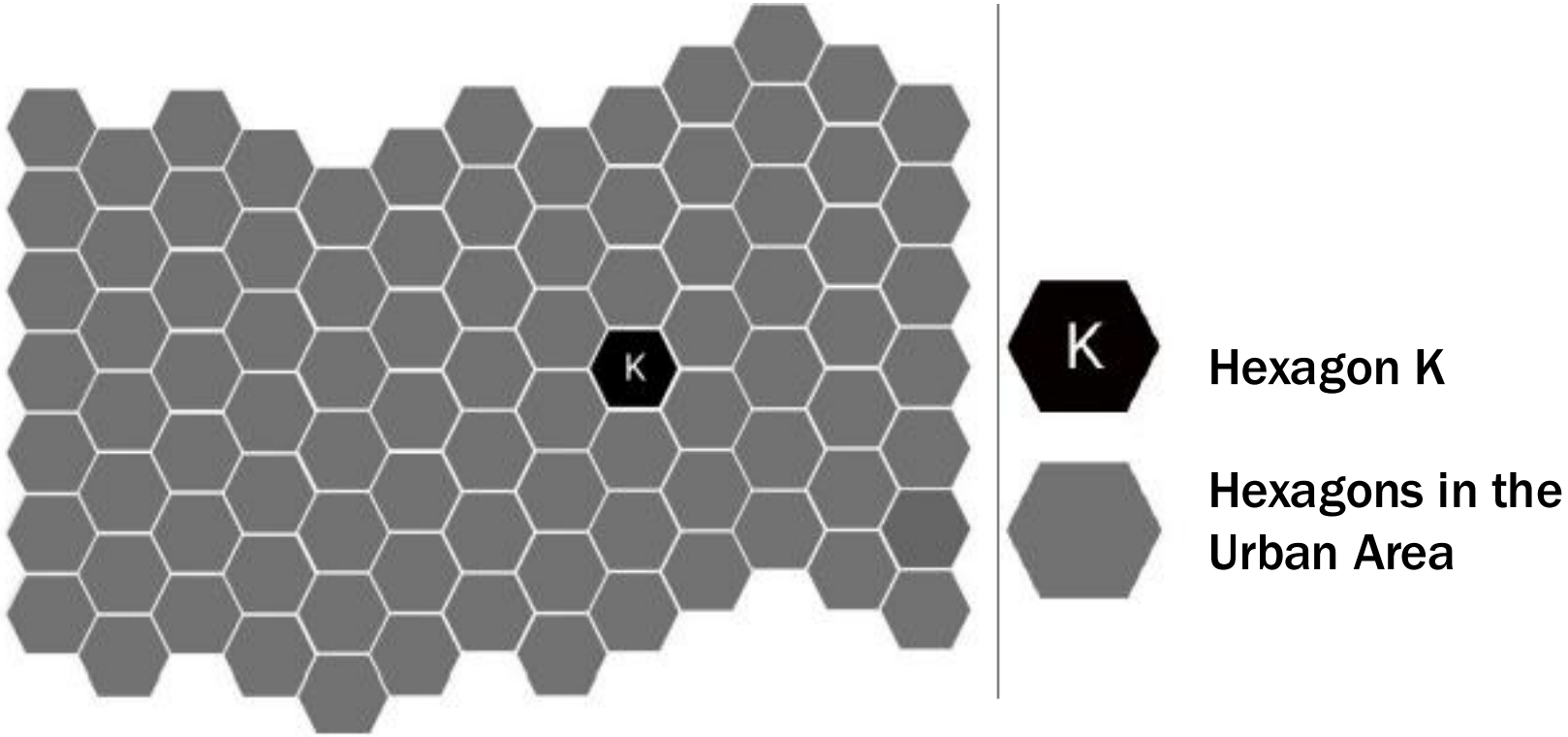
- **NEIGHBORHOOD OR ZONE:** Average Zonal Trip Distance
- **URBAN AREA:** Area Range



Area Range is the sum of average trip distances divided by the total number of hexagons in the urban area.

Density

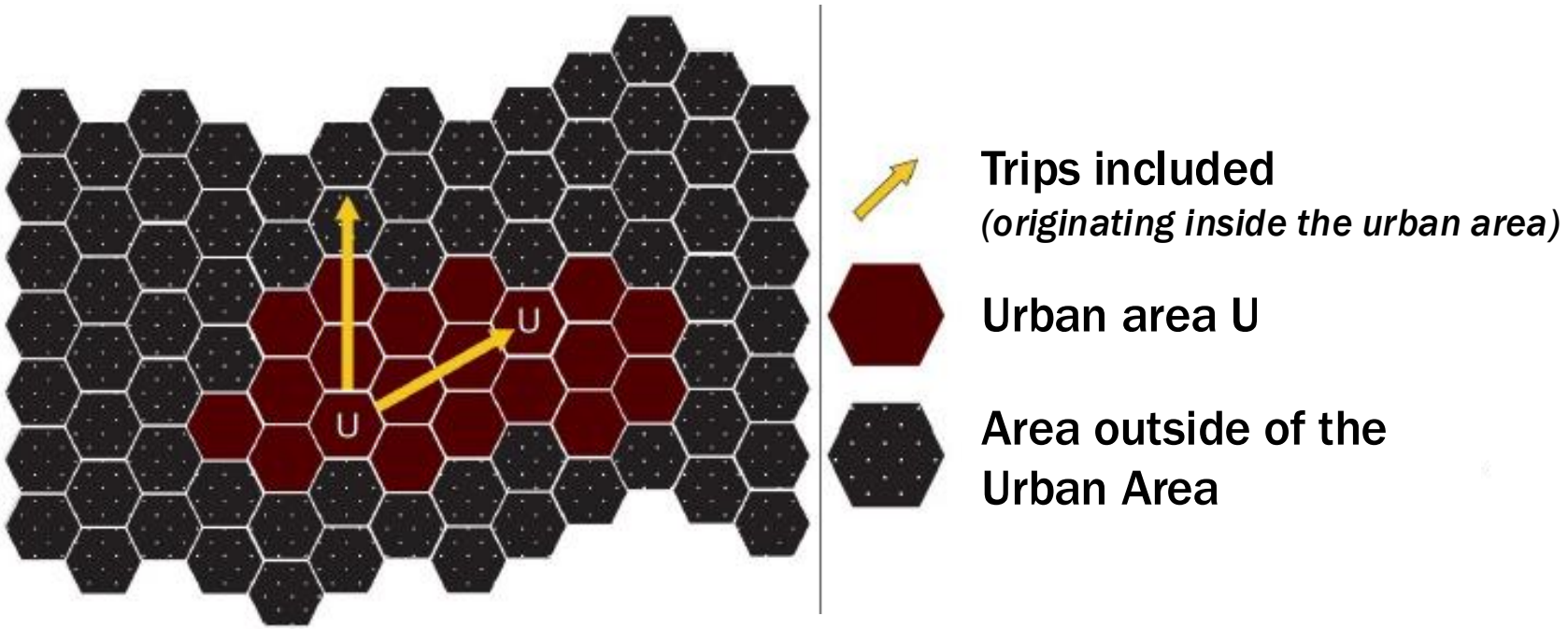
DENSITY measures how many trips start or end in a specific area.



Density is the number of trips originating from hexagon K divided by the total number of trips in the urban area.

Density Measures

- **NEIGHBORHOOD OR ZONE:** Zonal Trip Density
- **URBAN AREA:** Area Density
- **SEGMENT:** Segment Trip Density



Area Density is the number of trips originating inside the urban area divided by the number of hexagons in the urban area.

Policy Neutrality

- A unique aspect of these measures is that they are inherently ***policy neutral***.
- Rather than implying only moving in one direction is improvement, policies for these measures can be set based on the desires of those using them. Whether higher or lower values are better depends on the goals of the community.

How to Compare Results Across Urban Areas in the Urban Mobility Report

- Results for observed access for the 101 urban areas are not grouped by population, but into new clusters statistically based on more appropriate factors for auto access.

- The following criteria are recommended for interpreting results for an urban area:
  - **Best:** Same city over time with clear policy goal.
  - **Good:** Same city over time with no clear policy goal OR multiple cities within a cluster.
  - **Not recommended:** Cities in different clusters with no clear policy goal.

Large Urban Areas

Rank	Urban Area	TUC_0	Range (Miles)	Area (Miles^2)
1	Salt Lake City–West Valley City, UT	51.5%	4.1	301
2	San Jose, CA	47.7%	3.9	286
3	Omaha, NE–IA	47.6%	4.2	276
4	Las Vegas–Henderson, NV	44.0%	4.2	436
5	Oklahoma City, OK	34.3%	4.4	429
6	San Antonio, TX	28.5%	4.5	617
7	Columbus, OH	28.1%	4.2	524
8	Austin, TX	26.2%	4.1	624
9	Sacramento, CA	24.7%	4.2	473
10	Memphis, TN–MS–AR	23.0%	4.4	495
11	Kansas City, MO--KS	21.3%	4.5	722
12	Louisville/Jefferson County, KY–IN	21.3%	4.5	409

- Broadly, large cities from across the country tend to have higher coverage than as they are smaller in area but have similar roadway networks as very large cities.
- The large cities with the highest TUC values tend to be West Coast and Mountain cities. These cities are generally newer and have a different development pattern than cities further east.

East Coast and Central Plains Medium and Small Urban Areas

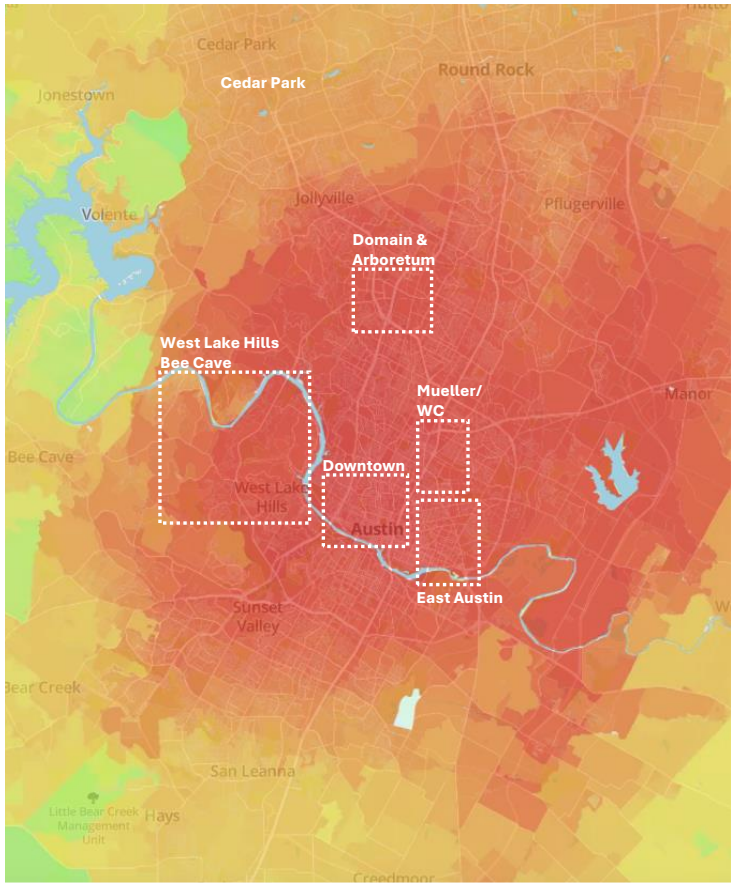
Rank	Urban Area	TUC_0	Range (Miles)	Area ($Miles^2$)
1	Corpus Christi, TX	55.6%	4.0	131
2	Beaumont, TX	54.6%	3.6	98
3	Wichita, KS	53.8%	4.3	232
4	Toledo, OH--MI	38.8%	4.1	249
5	Greensboro, NC	37.1%	4.1	171
6	Tulsa, OK	36.3%	4.5	344
7	Grand Rapids, MI	35.4%	4.3	280
8	Pensacola, FL--AL	32.0%	4.0	271
9	Rochester, NY	30.3%	4.3	298
10	Jackson, MS	29.7%	4.2	240
11	McAllen, TX	29.6%	4.0	327
12	Little Rock, AR	29.3%	4.2	271

These areas are likely clustered together as they were largely developed before the freeway era and tend to have lower population densities and lower lane miles of roadway.

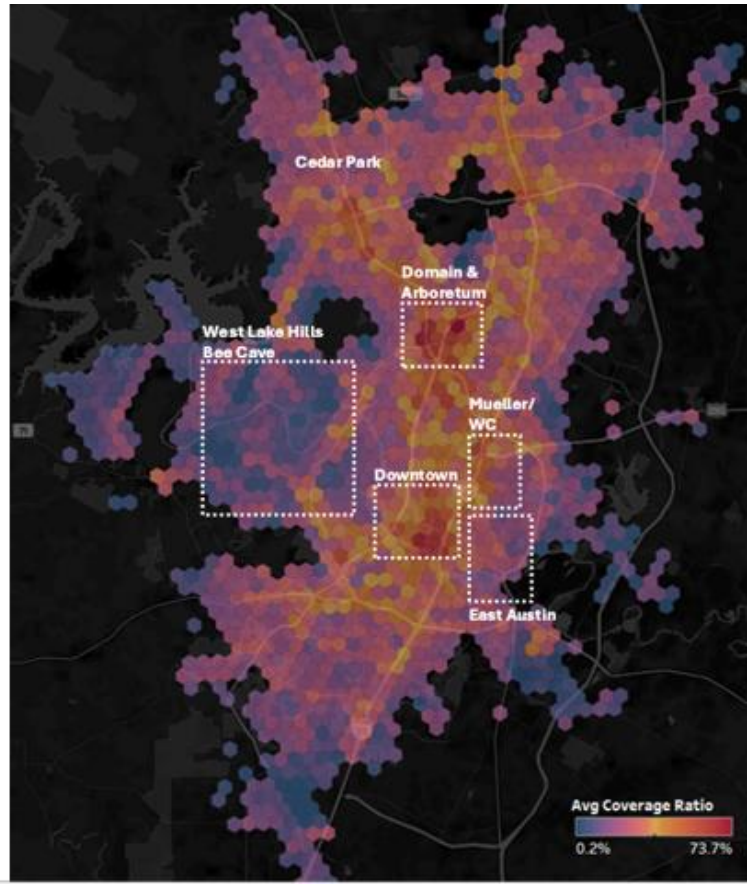
Neighborhood or Zone Example

Left: Auto Accessibility to jobs within 30 minutes, Austin, Texas

Right: Area coverage ratio (origins) for trips under 30 minutes, Austin, Texas

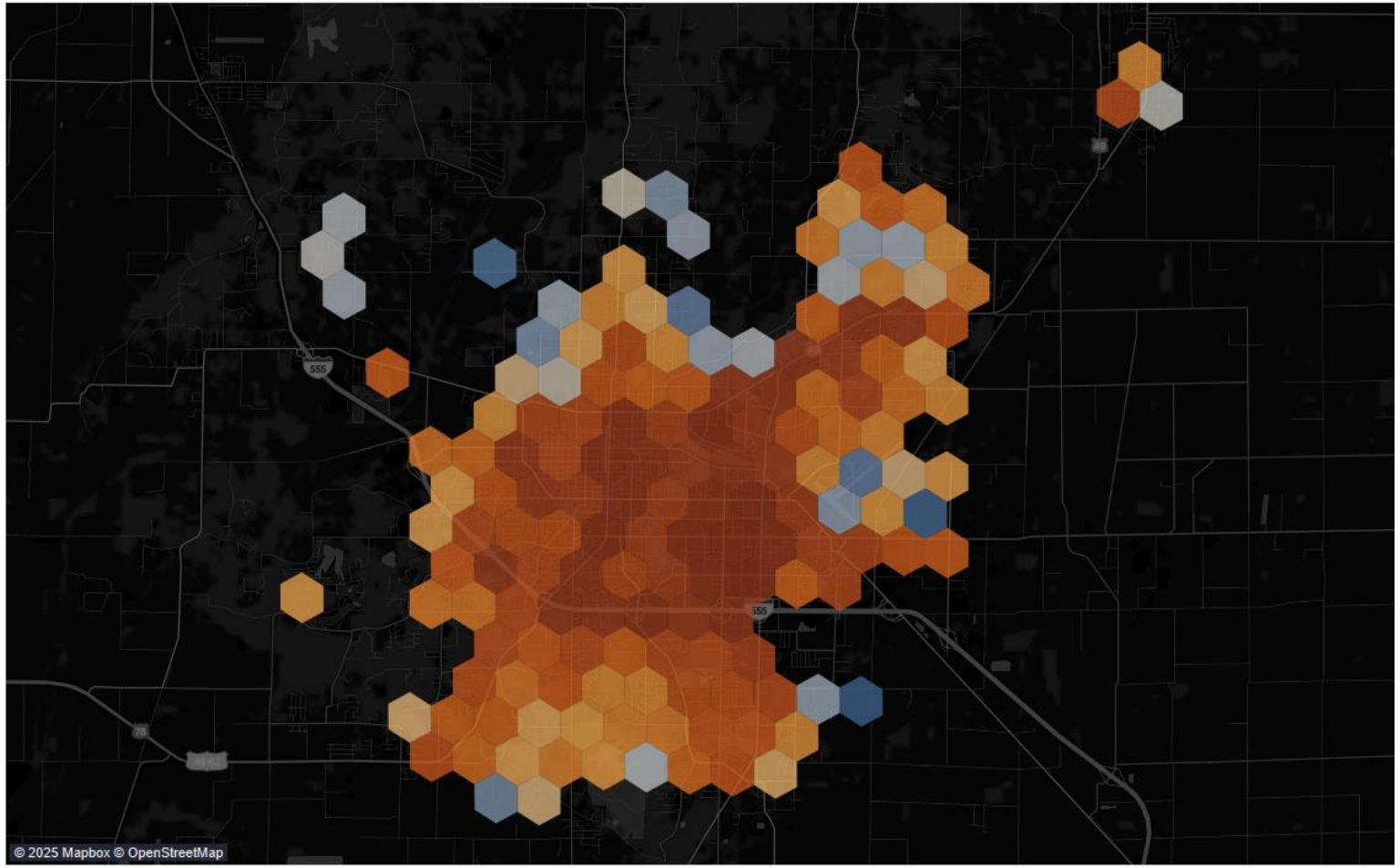


Source: Access Across America: Auto 2019, University of Minnesota



Source: Measuring Access Using Crowdsourced Travel Behavior Data: The Easy Button to Real Access and Equity?, National Institute for Congestion Reduction

Jonesboro – Coverage (Origin)



Total Urban Coverage: 72.4%

Vehicle trips up to 30 minutes can get to 72.4% of the Jonesboro area.

Area Range: 3.0 Miles

Vehicle trips up to 30 minutes travel an average of 3.0 miles with an average trip time of 9.4 minutes.

Memphis – Coverage (Origin)

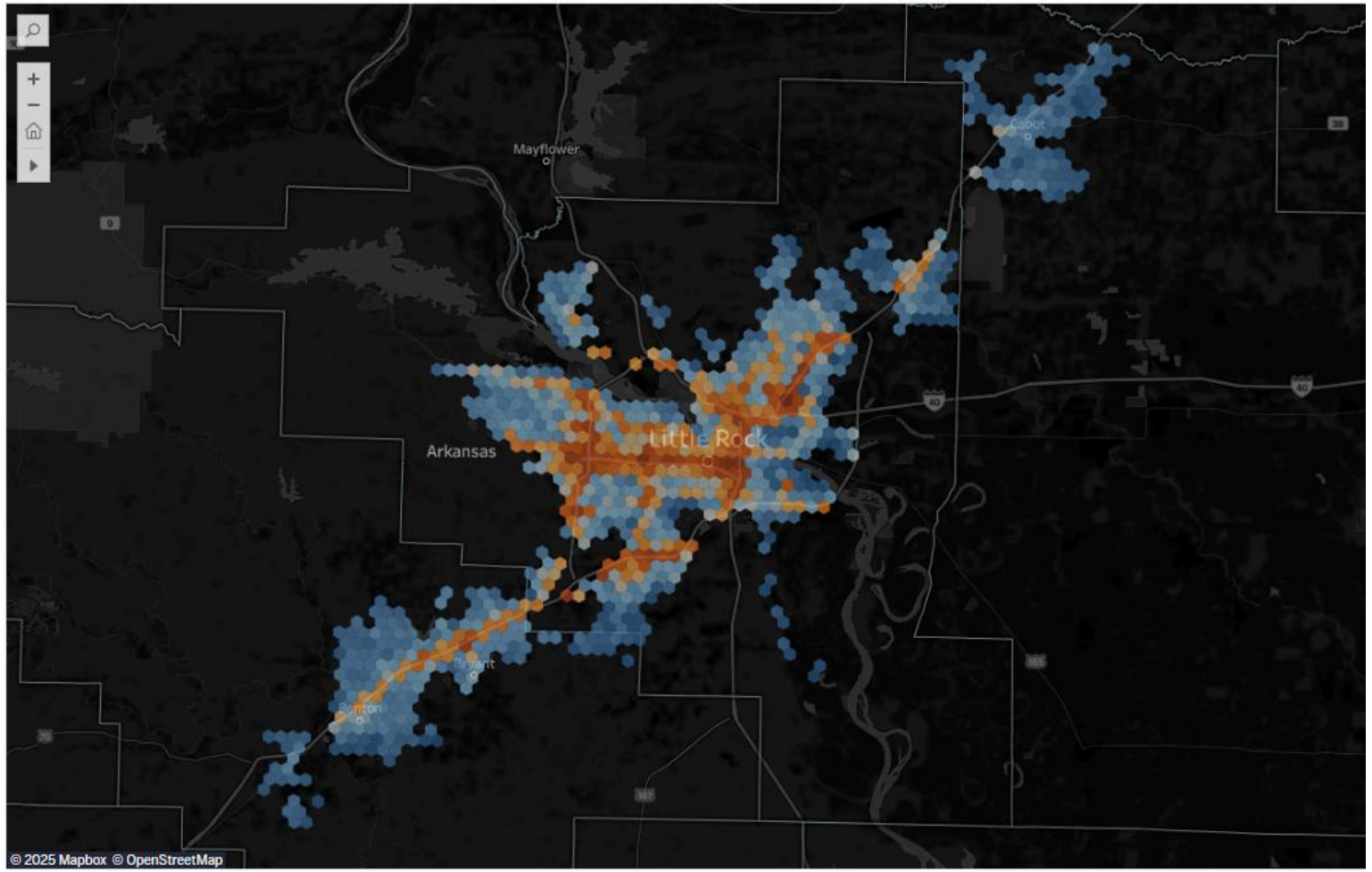
Total Urban Coverage: 23.0%

Vehicle trips up to 30 minutes can get to 23.0% of the Memphis area.

Area Range: 4.4 Miles

Vehicle trips up to 30 minutes travel an average of 4.4 miles with an average trip time of 10.1 minutes.

Little Rock – Coverage (Origin)



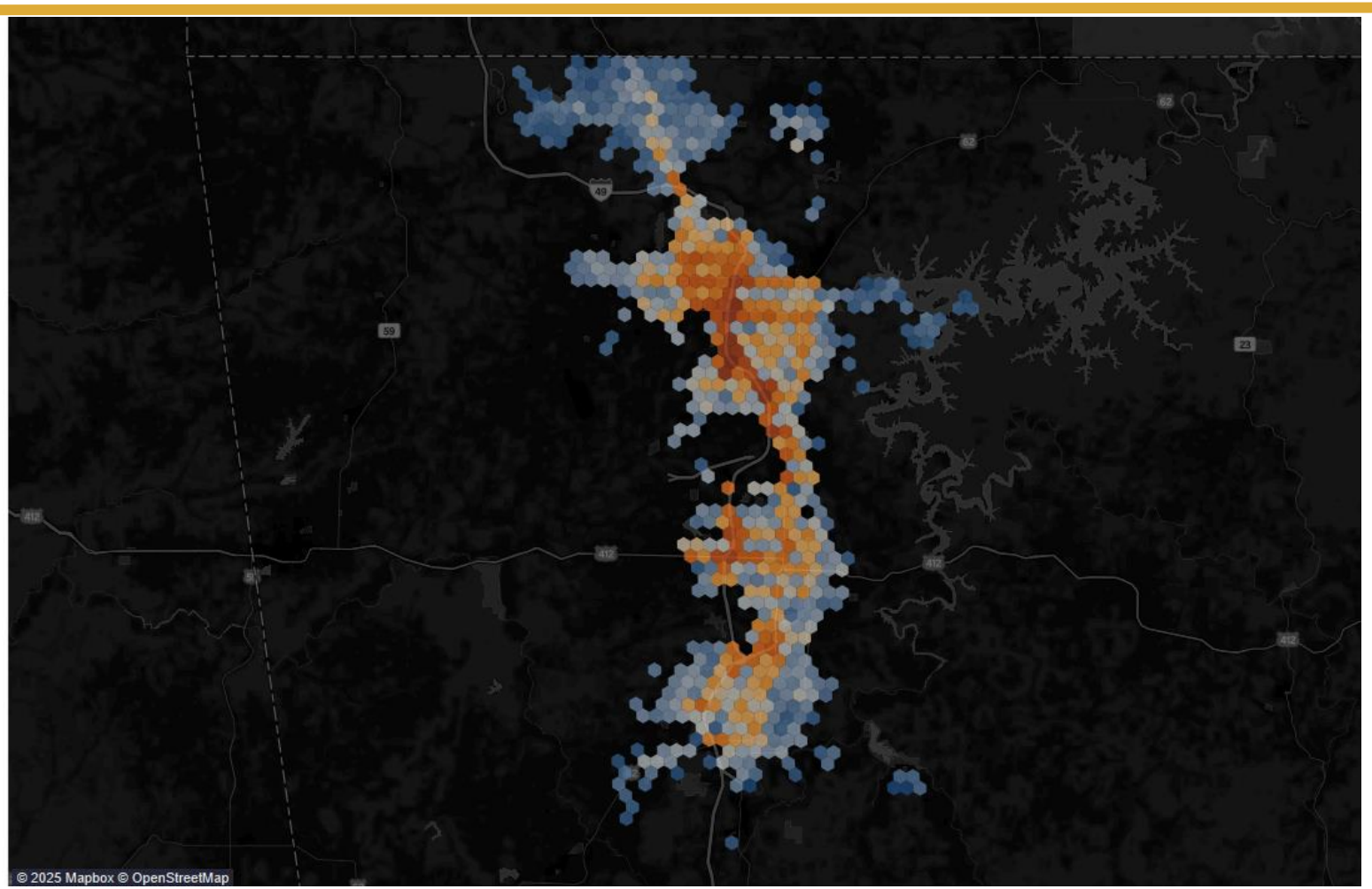
Total Urban Coverage: 29.3%

Vehicle trips up to 30 minutes can get to 29.3% of the Little Rock area.

Area Range: 4.2 Miles

Vehicle trips up to 30 minutes travel an average of 4.2 miles with an average trip time of 10.0 minutes.

Northwest Arkansas – Coverage (Origin)



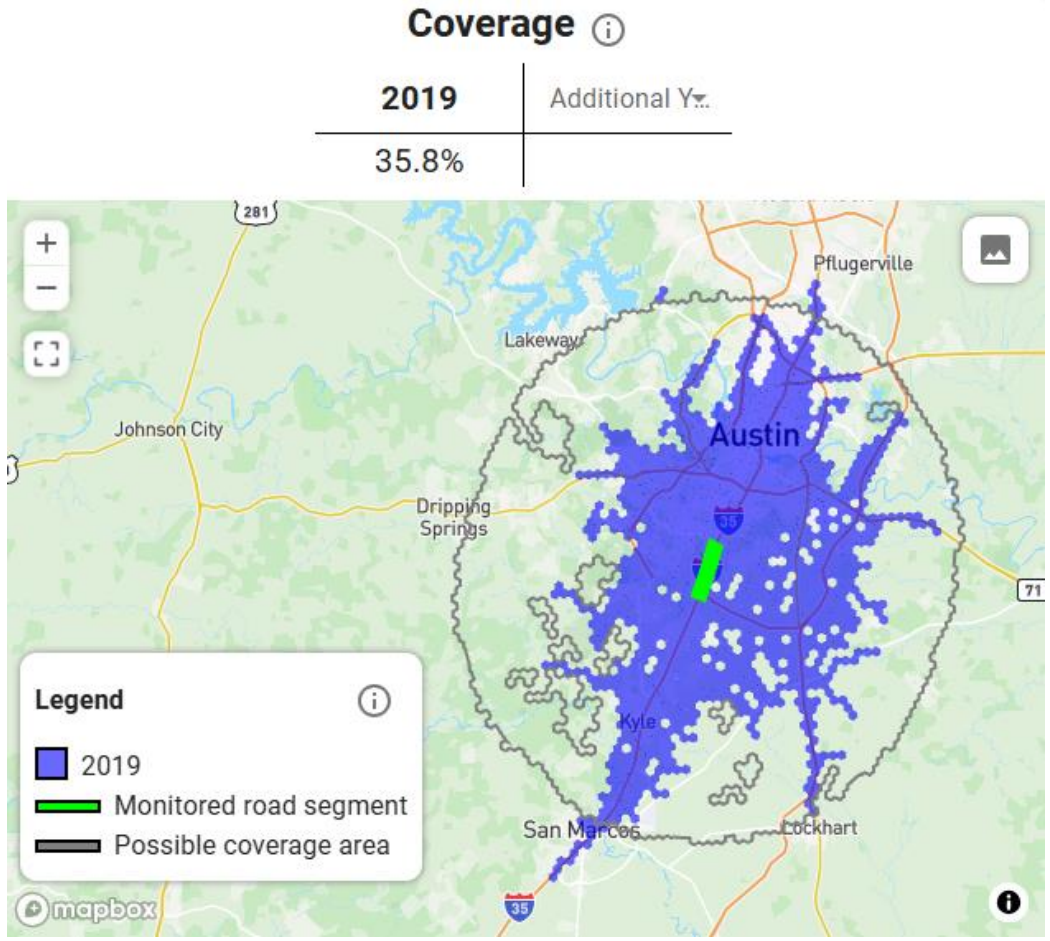
Total Urban Coverage: 37.9%

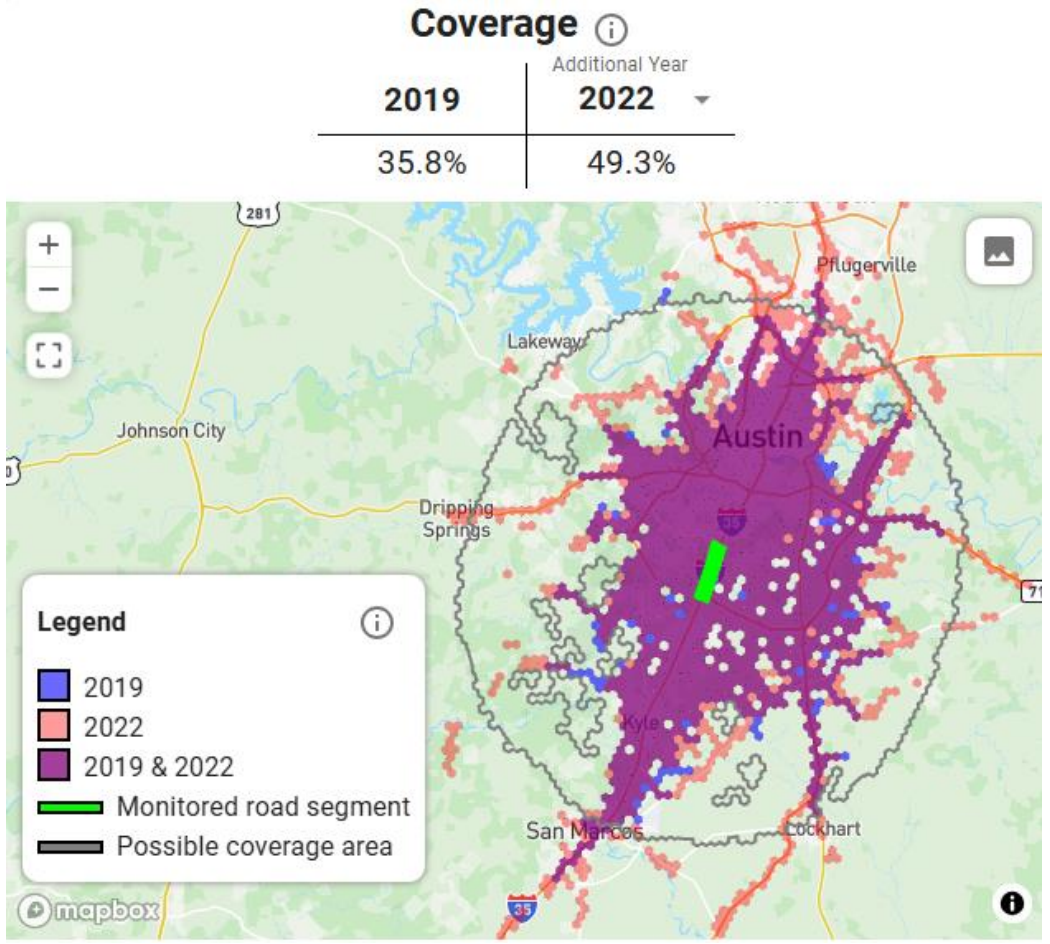
Vehicle trips up to 30 minutes can get to 37.9% of the Northwest AR area.

Area Range: 3.8 Miles

Vehicle trips up to 30 minutes travel an average of 3.8 miles with an average trip time of 10.0 minutes.

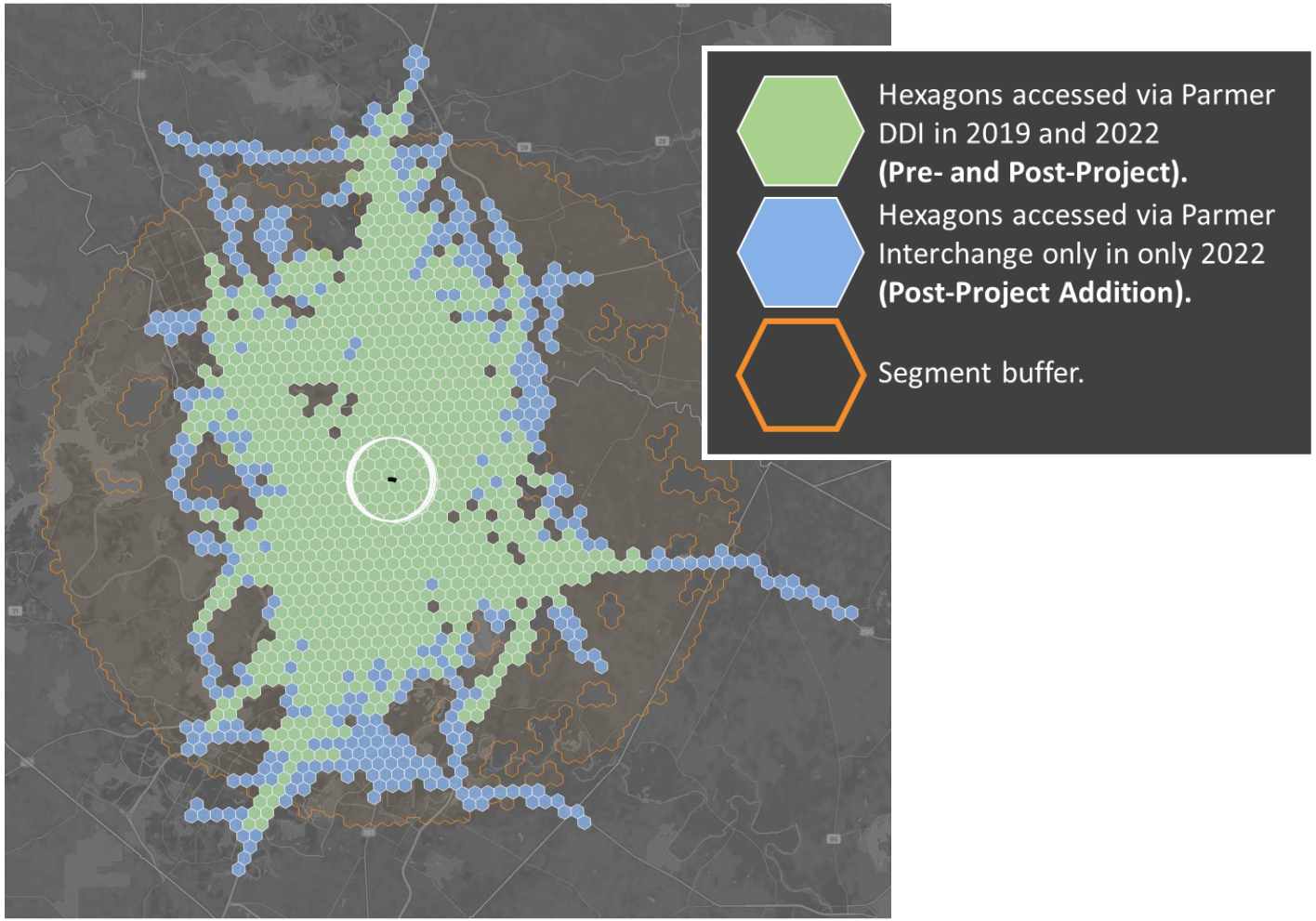
Roadway Segment – Change in Coverage
from 2019 to 2022, 15-minute time constraint





Economic Analysis – Project Impact

- Parmer Lane diverging diamond interchange in Austin
- 15-minute time constraint



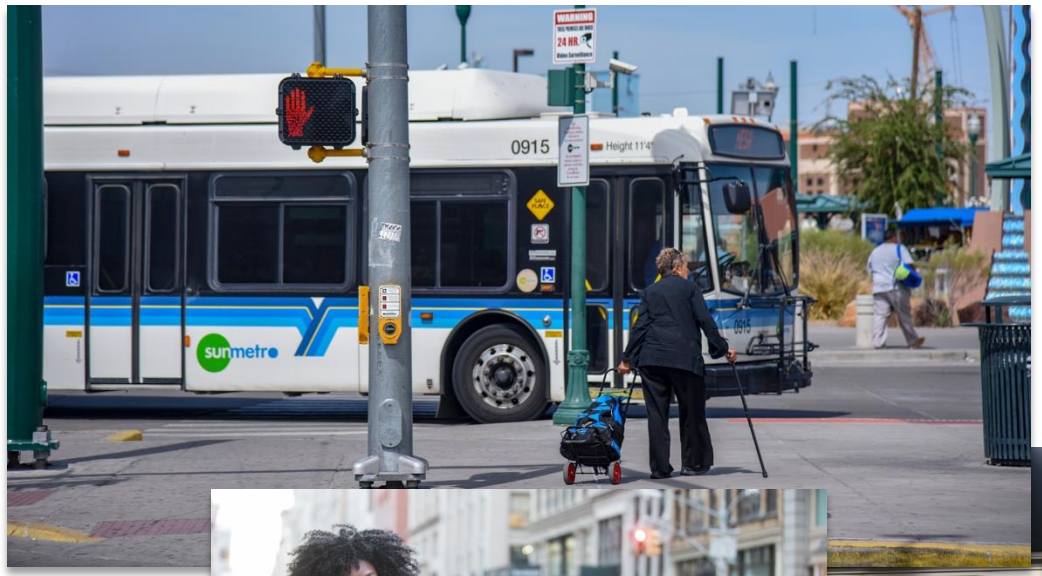
Project Impact Analysis – Results

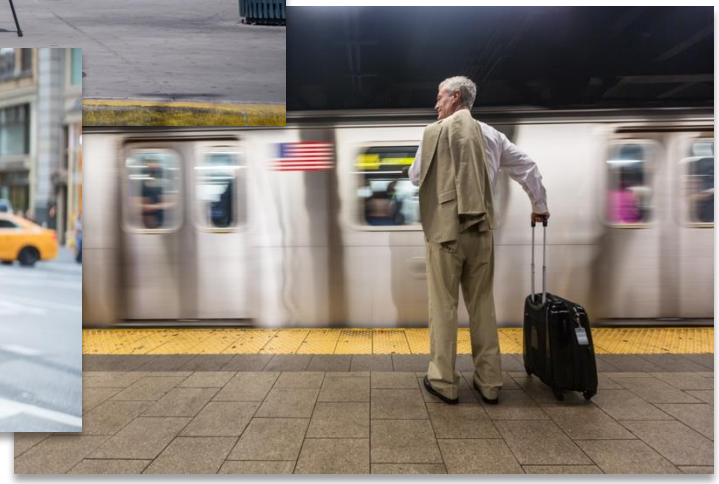
Industry	Employment pre-project	Employment post-project	Percent Increase
Other real estate	49,094	64,567	32%
Full-service restaurants	43,059	44,542	3%
Limited-service restaurants	40,503	43,779	8%
Employment and payroll of local govt, education	37,607	43,994	17%
Custom computer programming services	49,094	49,156	0%
Total	**1,265,837**	**1,564,176**	**24%**

Industry	Labor Income pre-project (2022 $M)	Labor Income post-project (2022 $M)	Percent Increase
Other real estate	$1,658	$1,706	3%
Full-service restaurants	$1,483	$1,702	15%
Limited-service restaurants	$1,271	$1,420	12%
Employment and payroll of local govt, education	$2,737	$3,096	13%
Custom computer programming services	$5,211	$7,497	44%
Total	**$107,522**	**$132,560**	**23%**

Future Directions

- Including non-auto trips.
- Connecting observed with the potential and capturing synergies.
- Inputting specific destinations or trip purposes into the analysis.
- Utilizing other products.





Questions?

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